DECLARATION

I, Masayuki Sakai, c/o Fukami Patent Office, of Mitsui Sumitomo Bank Minamimorimachi Building, 1-29, Minamimorimachi 2-chome, Kita-ku, Osaka-shi, Osaka, Japan, declare:

that I know well both the Japanese and English languages;

that to the best of my knowledge and belief the English translation attached hereto is a true and correct translation of Japanese Patent Application No. 10-187057, filed on July 2, 1998;
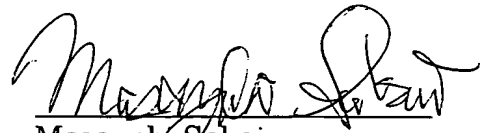
that all statements made of my own knowledge are true;

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Masayuki Sakai

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[Title of the Invention]   Electronic Book Display System, Electronic Book Sales Apparatus, Key Information Management Apparatus, Electronic Book Display Apparatus, and Recording Medium

[Claims for Patent]

[Claim 1]   An electronic book display system including an electronic book sales apparatus, a key information management apparatus, and an electronic book display apparatus, wherein

said electronic book sales apparatus stores contents of an electronic book and contents ID information to extract corresponding contents ID information upon designation of desired contents, and transmits at least one of said contents ID information and input user ID information to said key information management apparatus,

said key information management apparatus extracts contents key information and user key information from the transmitted contents ID information or user ID information to produce and transmit to said electronic book sales apparatus auxiliary information to display contents based on the key information,

said electronic book sales apparatus outputs said auxiliary information and said designated contents in a pair to said electronic book display apparatus, and

said electronic book display apparatus displays said designated contents based on output auxiliary information and said user key information prestored.

[Claim 2]   The electronic book display system according to claim 1, wherein said auxiliary information differs in content according to charge account status to said electronic book sales apparatus.

[Claim 3]   An electronic book sales apparatus comprising:

storage means for storing contents of an electronic book and contents ID information in a pair,

designation means for designating desired contents,

input means for inputting user ID information,

transmission means for transmitting at least one of contents ID information corresponding to said designated desired contents and input user ID information,

receive means for receiving auxiliary information to display contents, and

output means for outputting said auxiliary information and said designated desired contents in a pair.

[Claim 4]   The electronic book sales apparatus according to claim 3, comprising charge account processing means for processing charge account from a user, and having modify means for modifying contents of contents ID information to be transmitted according to charge account status by said charge account processing means.

[Claim 5]   A key information management apparatus comprising:

first storage means for storing contents ID information corresponding to contents of an electronic book and contents key information in correspondence,

second storage means for storing user ID information to identify a user and user key information in correspondence,

extraction means for extracting contents key information and user key information based on input contents ID information or user ID information from said first storage means and second storage means, and

processing means for applying predetermined processing based on input of extracted contents key information and user key information to output auxiliary information to display contents.

[Claim 6]   An electronic book display apparatus reproducing and displaying a recording medium in which data identified as contents or a processing program is recorded in units of a module readable in distinction for display,

wherein display attribute information is recorded in a module of said recording medium, and processing of said module is carried out selectively in accordance with reproduced display attribute information.

[Claim 7]   An electronic book display apparatus reproducing and displaying a

recording medium in which data identified as contents or a processing program is recorded in units of a module readable in distinction for display,

wherein auxiliary information to display contents is recorded in said recording medium, and processing of said module is carried out selectively based on said auxiliary information and a contents key prerecorded in said module.

[Claim 8]　A computer-readable recording medium in which data identified as contents or a processing program is recorded in units of a module readable in distinction for display,

wherein display attribute information is recorded in said module.

[Claim 9]　A computer-readable recording medium in which data identified as contents or a processing program is recorded in units of a module readable in distinction for display,

wherein auxiliary information to display contents at a particular device is recorded, in addition to said contents.

[Claim 10]　The electronic book sales apparatus according to claim 3 or 4, comprising:

first storage means for storing contents ID information corresponding to contents of an electronic book and contents key information in correspondence,

second storage means for storing user ID information to identify a user and user key information in correspondence,

extract means for extracting contents key information and user key information based on input contents ID information or user ID information from the first storage means and second storage means, and

processing means for applying predetermined processing based on input of extracted contents key information and user key information to output auxiliary information to display contents.

[Detailed Description of the Invention]

[Technical Field to Which the Invention Belongs]

The present invention relates to a system distributing data in digital form, and various apparatuses and recording medium that can be used in such a system. Particularly, the present invention relates to an electronic book display system distributing digital contents electronically published for reproduction and displayed at each terminal, and various apparatuses and recording medium used in such a system.

[Conventional Art]

In accordance with the recent development of hardware and software, electronic books are released lively as a new form of books in lieu of paper media already available. It is now possible to look up in a dictionary or read a story through a personal computer or the like.

To this end, an electronic book must be reproduced and displayed to the user. The display apparatus has various display attributes, and there are cases where the contents of an electronic book cannot be reproduced properly. Let us take image data as an example. When data including display attributes such as a certain resolution, number of colors and gradation tones is to be displayed at a display apparatus having different display attributes, it is necessary to convert data into display data matching the display attribute through methods such as resolution conversion (magnification, reduction), reducing the number of colors, dithering process and the like. However, the picture quality will be degraded if the same process is applied on the entire region of the former image data.

An apparatus to overcome this problem by altering the contents of image processing such as magnification, reduction, gradation tone conversion and the like according to the type of image in each region through designation of a region is disclosed in, for example, Japanese Patent Laying-Open No. 62-277855 (Conventional Example 1).

In contents distribution of electronic books, copyright protection is an important factor. In view of this issue, an apparatus having encrypted digital data and information required to decrypt the relevant data prestored in a recording medium at the

user side and that can charge specific users possessing this recording medium is disclosed in Japanese Patent Laying-Open No. 5-122701 (Conventional Example 2).

[Problems to be Solved by the Invention]

Conventional Example 1 has problems set forth below. The first problem is that the user must specify a region or select a process. The operation is extremely tedious. The second problem is that a process adaptive to the region must be identified from display data in order to render such tedious operation automatic. This processing will impose a great load. Therefore, it will be difficult to process an image at high speed with a portable terminal or the like that is inferior in hardware.

In Conventional Example 2, there is a problem that charging the fee for each individual data is difficult even in the case where a plurality of data are provided in the medium since charging is effected on a medium-by-medium basis.

In view of the above-described problems, an object of the present invention is to provide a system, various apparatuses, and a recording medium that allows reproduction and display appropriate for an electronic book display apparatus having various display attributes, and that can provide display to a proper user, as well as allowing modification of the display contents in a flexible manner according to charge account status for respective contents.

[Means for Solving the Problem]

An electronic book display system according to claim 1 includes an electronic book sales apparatus, a key information management apparatus, and an electronic book display apparatus. The electronic book sales apparatus has the contents of an electronic book and contents ID information stored to extract corresponding contents ID information when desired contents is designated, and transmits at least one of the contents ID information and input user ID information to the key information management apparatus. The key information management apparatus extracts contents key information and user key information from the transmitted contents ID information or user ID information respectively to generate and transmit to the electronic book sales

apparatus auxiliary information required to display contents based on the key information. The electronic book sales apparatus outputs the auxiliary information and designated contents to the electronic book display apparatus in a pair. The electronic book display apparatus displays the designated contents based on the output auxiliary information and prestored user key information.

In the electronic book display system according to claim 2, the auxiliary information differs according to charge account status to the electronic book sales apparatus in the electronic book display system of claim 1.

The electronic book sales apparatus according to claim 3 includes storage means for storing contents of an electronic book and contents ID information in a pair, designation means for designating desired contents, input means for inputting user ID information, transmission means for transmitting at least one of contents ID information corresponding to designated desired contents and user ID information, receive means for receiving auxiliary information to display contents, and output means for outputting the auxiliary information and designated desired contents in a pair.

In the electronic book sales apparatus according to claim 4, charge account processing means for charging from a user is included, and has modify means for modifying contents of contents ID information to be transmitted according to charge account status by the charge account processing means, in the electronic book sales apparatus according to claim 3.

The key information management apparatus according to claim 5 includes first storage means for storing contents ID information corresponding to contents of an electronic book and contents key information in correspondence, second storage means for storing user ID information to identify a user and user key information in correspondence, extract means for extracting contents key information and user key information based on input contents ID information or user ID information from the first storage means and second storage means, and processing means for applying processing based on input of extracted contents key information and user key

information to output auxiliary information to display contents.

The electronic book display apparatus according to claim 6 reproduces and displays a recording medium in which data identified as contents or a processing program is recorded in units of a module readable in distinction for display. Display attribute information is recorded in the module of the recording medium, and processing of the module is carried out selectively according to the reproduced display attribute information.

The electronic book display apparatus according to claim 7 reproduces and displays a recording medium in which data identified as contents or a processing program is recorded in units of a module readable in distinction for display. Auxiliary information to display contents is recorded in the recording medium, and processing of the module is carried out selectively based on the auxiliary information and contents key prerecorded in the module.

The computer-readable recording medium according to claim 8 is a recording medium in which is recorded data identified as contents or a processing program in units of a module readable in distinction for display. Display attribute information is recorded in the module.

The computer-readable recording medium according to claim 9 has data identified as contents or a processing program recorded in units of a module readable in distinction for display. In addition to the contents, auxiliary information to display contents at a certain apparatus is recorded.

The electronic book sales apparatus according to claim 10 includes first storage means for storing contents ID information corresponding to contents of an electronic book and contents key information in correspondence, second storage means for storing user ID information to identify a user and user key information in correspondence, extract means for extracting contents key information and user key information based on input contents ID information or user ID information from the first storage means and second storage means, and processing means for applying predetermined processing

based on input of extracted contents key information and user key information to output auxiliary information to display contents. in the electronic book sales apparatus according to claim 3 or 4.

[Embodiment of Invention]

A system reproducing and displaying an electronic book published electronically will be described on the whole with reference to Fig. 1. Referring to Fig. 1, 101 designates a viewer (electronic book display apparatus) that reads out via a medium 102 or directly from a vending device 103 digital data corresponding to contents of an electronic book from a publisher 108 or a distribution center 104 (generally encoded, and referred to as "encoded contents" hereinafter), which are reproduced and displayed to be provided to user 106 in a visual form.

102 designates a medium (recording medium) into which encoded contents to allow reproduction and display by viewer 101 is written through vending device 103. Medium 102 may be a magneto optical disk, optical disk, magnetic disk, hard disk, magnetic tape, IC card and the like, and not limited thereto. Any computer-readable device is allowed.

103 designates a vending device (electronic book sales apparatus) that writes into medium 102 encoded contents stored internally or distributed from distribution center 104 in accordance with the contents request and charge account of a user 106. The encoded contents may be downloaded directly from vending device 103 to viewer 101 without the intervention of medium 102. In this case, download is effected towards the medium in viewer 101 through wire or radio communication.

108 designates a publisher that edits and polishes the copyrighted work written by a writer 109 to convert the work into electronic form to produce and store encoded contents. Also, encoded contents are transferred to distribution center 104 in response to a request from distribution center 104.

104 designates a distribution center to transfer encoded contents from publisher 108 to vending device 103 in response to a distribution request of vending device 103.

Connection is established between vending device 103, distribution sensor 104 and publisher 108 through radio such as a satellite or wire communication line.

105 designates the manufacturer of viewer 101, and provides a user key that will be described afterwards into viewer 101 and a key management center 110.

Key management center 110 designates a key management center (key information management apparatus) to administer and issue key data that will be described afterwards through radio or wire communication with vending device 103, manufacturer 105 and publisher 108. For the sake of simplification, only one of each apparatuses is exemplified in the present system. In general, the system includes a plurality of units of various apparatuses.

The structure set forth above is directed to distribution through distribution center 104. Distribution is also allowed to a provider 111 and a household terminal 112 (for example, personal computer) through the Internet in a similar manner. In this case, the function of provider 111 is equivalent to that of distribution center 104, and the function of household terminal 112 is equivalent to that of vending device 103. It is to be noted that paying for the encoded contents by the user 106 is effected with respect to provider 111.

The apparatuses employed in the system of Fig. 1 will be described in detail sequentially.

First, the structure of the vending device of Fig. 1 will be described with reference to Fig. 2. Vending device 103 includes a CPU 201 controlling respective internal components, a memory 202 to store processed contents, programs, and the like, a hard disk 203 to store encoded contents and plurality of auxiliary informations to properly reproduce or display the encoded contents, a key management center line I/F (interface) 205 to connect a line for communication with key management center 110, a distribution line I/F 206 to connect a line for communication with distribution center 104, a display device to display a screen for the user of the vending device, a user interface 208 to apply designation to search for and purchase desired contents while confirming

the screen of display device 207, a medium writer 209 of a disk drive or the like to write into a medium 102, a communication port 210 for communication with viewer 101, and a charge account device 211 confirming the money or a prepaid card in exchange for purchasing the encoded contents by the user and settling the charge account, all connected through an internal bus 204.

The structure of viewer 101 will be described here with reference to Fig. 3. Viewer 101 is formed of a CPU and a DSP providing entire control of viewer 101, and includes a processing unit 301 to apply various calculation processes, a RAM 302 for temporarily storage of information by processing unit 301, a ROM 303 storing a processing program used by processing unit 301 as well as a user key, described afterwards, that is information unique to viewer 101, an internal medium 304 to store encoded contents read from vending device 103, a medium drive 308 such as disk drive to read out encoded contents from medium 102, a communication port I/F 306 for communication with vending device 103, an image memory 307 to store image to be provided to a user after encoded contents are interpreted, an LCC (Liquid Crystal Display) 308 to display the contents of image memory 307, an input unit 309 such as a tablet, button or crosshair cursor, providing the control of a serial port to effect input from a user, and an audio unit 310 to input and output audio/music through a microphone, speaker, audio codec, connected through a system bus 311.

The structure of the key management center will be described with reference to Fig. 4. Key management center 110 includes a CPU 401 to control various elements in the present apparatus, a memory 402 to store processed contents and programs, a hard disk 403 to store information such as a user key that will be described afterwards, a vendor line I/F 405 to connect a line for communication with vending device 103, a publisher line I/F 406 to connect a line for communication with publisher 108, and a manufacturer line I/F 407 to transmit/receive required information to/from manufacturer 105, all connected through an internal bus 404. Instead of obtaining required information through communication with vending device 103, publisher 108 and

manufacturer 105, required information can be placed in a medium 411 likewise medium 102 to be input/output through medium drive 410.

The contents of communication such as key information among vending device 103, viewer 101, key management center 110 and publisher 108 will be described with reference to the functional diagram of Fig. 5.

Key management center 110 includes a contents correspondence table 501 and a user correspondence table 502 in hard disk 403.

In contents correspondence table 501, a contents ID (identifier) that is information specific to encoded contents of an electronic book produced at a publisher and a contents key required to interpret, reproduce or display the encoded contents at viewer 101 are administered and stored in a pair.   A plurality of contents key may be set corresponding to one contents ID.   The information in contents correspondence table 501 is produced by any of the methods set forth below.

(1)   A contents ID is produced by the following methods, and transmitted to publisher 108.

(Method 1) Key management center 110 preassigns a contents ID for each publisher 108.

(Method 2) In response to a request from publisher 108, key management center 110 produces an ID each time.

(2)   A contents key is produced by the following methods, and transmitted from publisher 108.

(Method 1) Publisher 108 produces a contents key corresponding to an obtained contents ID set forth above.   The contents ID and contents key are received in a pair at key management center 110 to be added to contents correspondence table 501.

(Method 2)   The contents ID obtained by the above (1) is transmitted to key management center 110 where an encode key and a decode key corresponding to that contents ID are produced.   Only the encode key is transmitted to publisher 108. Publisher 108 encodes the contents of an electronic book using the transmitted encode

key, while key management center 110 adds the set of a contents ID and a decode key into contents correspondence table 501.

The above description is based on the case where a contents ID and contents key are assigned for every contents of an electronic book. The same ID and key may be set for all contents, or only one set of an ID and key may be provided in accordance with each publisher.

User correspondence table 502 will be described here. In user correspondence table 502, a user ID that is information specific to a user or viewer and a user key required to interpret, reproduce, or display encoded contents through the corresponding viewer are administered and stored in a pair. The information in user correspondence table 502 is produced by any of the methods set forth below.

(Method 1) Key management center 110 produces a user ID and user key by assigning the same for each viewer, which are added into user management table 502, and then transmitted to user 106 or manufacturer 105.

(Method 2) Key administration center 110 produces a user ID by assigning the same for each viewer, which is transmitted to manufacturer 105. Manufacturer 105 receiving the user ID embeds the user key in the viewer, and then transmits the set of a user ID and produced user key to the key management center. Key management center 110 adds the received set of user ID and corresponding user key into user management table 502.

The above description is based on the case where an ID and key are assigned for each viewer. The same ID and key may be provided corresponding to all viewers, or one set of an ID and key may be provided corresponding to every predetermined number of viewers (for example, a plurality of viewers provided to a library or school). The present embodiment is described in which the vending device and key management center are separate apparatuses. A similar function can be realized even if the configuration of a key management center is present within a vending device.

The operation in the case where a user interprets, reproduces, and displays

encoded contents through a viewer will be described here.

First, the user selects encoded contents that he/she wishes to purchase through a display device 207 and user interface 208 of vending device 103, and also establishes connection with communication port 210 and viewer 101, as necessary. After connection with viewer 101 is confirmed, CPU 210 reads out the user ID in viewer 510 by communication with viewer 101 and stores the readout user ID in memory 202. The user ID may be input directly by a user through user interface 208.

Hard disk 203 has encrypted contents and corresponding contents ID 504 stored in plurality for each title of an electronic book as the predetermined unit. CPU 203 extracts encoded contents corresponding to the contents selected by the user and a contents ID from hard disk 203.

Then, the money or a prepaid card corresponding to the value of the selected contents is inserted into a charge account device 211 by the user. Charge account device 211 confirms the value and settles the account.

When CPU 201 receives a settlement process end signal by charge account device 211, CPU 201 transmits the user ID and selected contents ID in memory 202 to key management center 110. In the case where there is only one contents ID or user ID, transmission of an associated ID is not conducted. For example, when all the users have the same ID and key, transmission of a user ID from the vending device is not carried out.

By the process of vending device 103 set forth above, key management center 110 receives a contents ID or user ID, which are written into each table. Then, a contents key corresponding to the received contents ID is searched for and extracted from contents correspondence table 501 to be stored in memory 402. Also, a user key corresponding to the received user ID is searched for and extracted from user correspondence table 502 to be stored in memory 402.

Key management center 110 carries out a calculation process set forth below with an operation module 503 through CPU 401 and the like using user correspondence

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table 502.   Operation module 503 outputs a bit string as auxiliary information based on the inputs of the extracted user key and contents key.   A specific example of auxiliary information is the bit string shown in Fig. 6.   This bit string is formed of a bit number region 601 representing the length of that bit string in the number of bits (32-bit length here), a subsequent operation type identify region 602, and an operation result region 603 (information of variable length).

The process of operation module 503 will be described hereinafter.   Operation module 503 selects an operation from a plurality of operation programs stored in internal memory 402 or hard disk 403.   The identifier of the selected operation is written into operation type identify region 602 in the bit string of Fig. 6.   Then, the operation selected with respect to the input user key and contents key is carried out. The operation result is written into operation result region 603.   Lastly, the length of the bit string is counted and written into bit number region 601.

The operation carried out here is a 2-input, 1-output operation F, satisfying the condition set forth below.

(Condition) An operation G of $Y = G(B, X)$ is present with respect to the operation result obtained by $B = F(X, Y)$ (condition end).

In the present embodiment, specific description will be provided with "operation" defined as F, and "solution operation" defined as G.   There are an infinite number of combinations of operation F and solution operation G.   Some examples are shown hereinafter.

$F(X, Y) = X + Y$ and $G(B, X) = B - X$.

$F(X, Y) = X \times Y$ and $G(B, X) = B \div X$.

$F(X, Y) = X - Y$ and $G(B, X) = B + X$.

$F(X, Y) = X \div Y$ and $G(B, X) = B \times X$

(provided that X is not 0).

$F(X, Y) = X \,\hat{}\, Y$ and $G(B, X) = \text{Log}_X B$

(provided that $X \,\hat{}\, Y$ indicates an exponential operation).

F (X, Y) = Y > X and G (B, X) = B < X

(provided that, in Y > X, numeric Y is a binary digital bit string, rotated rightwards X times, and in B < X, numeric B is a binary digital bit string, rotated leftwards X times).

A solution operation G is preset in correspondence to operation F. After an operation type identifier is assigned to each set ,the set of operation F and the operation type identifier is stored in key management center 110. Also, the set of corresponding solution operation G and the operation type identifier is prestored in viewer 101.

Following the above-described operation, key management center 110 transmits to vending device 103 a bit string of Fig. 6 including the operation type identifier used in the operation and the operation result.

Then, vending device 103 writes the received bit string and the encoded contents already selected by the user in a pair into medium 102 by medium writer 209.

The above description is based on the case where one type of bit string is received and recorded into medium 102 with respect to single contents. It is also possible to request key management center 110 to produce a plurality of bit strings according to the user charge account status with respect to single contents, and receive the corresponding plurality of bit strings to be recorded into medium 102, as set forth below.

In other words, contents charge account information to transmit contents ID information differing according to the charge account status is to be stored together with the encoded contents in vending device 103. Specifically, a contents charge account information table 1210 is stored as shown in Fig. 7, identified as the contents charge account information.

Based on this table, when a user inserts 100 Japanese yen for the relevant contents, vending device 103 will transmit only a contents ID1 to key management center 110, and receives only the bit string corresponding to contents ID1. When the user inserts 300 Japanese yen, vending device 103 transmits contents ID1, contents ID2

and contents ID3 to key management center 110, and receives three bit strings corresponding to respective contents IDs. In other words, the type and number of contents IDs transmitted to key management center 110 differ depending upon the charge account status. Key management center 110 transmits to vending device 103 a bit string corresponding to the received contents, and stores the bit string and selected encoded contents into medium 102 in a pair.

The process at viewer 101 for medium 102 in which the set of a bit string and encoded contents are recorded as set forth above will be described hereinafter.

First, viewer 101 separates the bit string from encoded contents in medium 102 using a separation module 506. The bit string is transferred to a solution operation module 507, whereas the encoded contents are transferred to a decode module 508.

Solution operation module 507 carries out a solution operation based on the inputs of a bit string from separation module 506 and a user key incorporated in advance to generate and output to decode module 508 a contents key. This operation includes the steps of extracting an operation result 603 from the bit string and taking the same as B of solution operation, then extracting operation type identifier 602, selecting a corresponding solution operation G, and finally carrying out selected solution operation G on incorporated user key X and operation result B as the input to obtain a contents key.

Decode module 508 decodes the encoded contents input from separation module 506 using the content key output from operation module 507 in accordance with the method described in detail hereinafter for display at display module 509.

Instead of transmitting the original contents key 512 to key management center 110 at the time of producing encoded contents at publisher 108, an encryption 513 of contents key 512 encrypted with a certain encryption key 514 using a predetermined encryption method can be transmitted to key management center 110 as the contents key, whereas viewer 101 can carry out the process set forth below with a decryption of the contents key in the encoded contents decrypted with a decryption key 516 in the

viewer as the contents key.   Decryption key 516 used herein functions to decrypt the encryption of encryption 513.

The processing of interpreting, reproducing and displaying encoded contents in viewer 101 will be described hereinafter with reference to Fig. 8.

Viewer 101 has encoded contents 701 input from medium 102 through medium drive 305 or the like, and obtains a contents key 515 by the processing of solution operation module 507 with the bit string as the input.   In Fig. 8, three types of bit strings are related to encoded contents.   As a result, three contents key are produced and stored in RAM 302 in the viewer.   Encoded contents 701 are interpreted by an interpretation module 703 to be divided into a processing procedure 704, and various data module 705.   Processing produce 704 is executed by a corresponding processing module 706.   At this stage, the processing module carries out execution by appropriately referring to data module 705 produced by interpretation module 703. Data module 705 includes image data that will be described afterwards, processing table, font data, and processing modules to provide a processing function not present in the viewer.   Contents key 702 is referred to appropriately as will be described afterwards during the process of interpretation module 703 and processing module 706.

There are various display attributes in the viewer.   These display attributes are stored in the viewer as viewer attribute 707, which is appropriately referred to during the process of interpretation module 703 and processing module 706.

The display attributes of the viewer will be described with reference to Fig. 9. Fig. 9(a) shows a viewer using LCDs that can display two screens on different liquid crystal panels of 768 × 1024 pixels and monochrome 8 tones, actually as a book.   Figs. 9(b) and (c) correspond to the case where there is only one screen with the number of pixels and tones identical to those of the viewer of Fig. 9(a).   In this case, display data of one screen can be displayed as shown in Fig. 9(b), and display data of two screens can be shrunk to be displayed together, as shown in Fig. 9(c).   Fig. 9(d) corresponds to a structure of displaying data of one screen using an LCD of 480 × 640 pixels and

260,000 colors. The display attributes of each viewer are registered in RAM 302 as display attribute 707 corresponding to the display format of the viewer. The display attributes include the number of LCDs (the number of LCDs incorporated in the viewer), the LCD number of pixels (the number of pixels in the horizontal direction and vertical direction of the LCD incorporated in the viewer), the LCD color (discrimination between monochrome/color, number of gradation tones, number of colors), display directions (indicating whether the display direction is based on vertical or horizontal direction when viewing the LCD), and the number of pages (indicating how many pages are to be displayed in one LCD screen). The display attribute corresponding to each display format of Fig. 9 is shown in Table 1.

[Table 1]

Display Format	No. of LCDs	LCD Number of Pixels (X × Y)	LCD Color	Displayed Direction	Numbers of Pages
(a)	2	768 × 1024	Monochrome 8 tones	Vertical	1
(b)	1	768 × 1024	Monochrome 8 tones	Vertical	1
(c)	1	768 × 1024	Monochrome 8 tones	Horizontal	2
(d)	1	480 × 640	26,000 colors	Vertical	1

The coordinate system employed in the present embodiment will be described with reference to Fig. 10. The coordinate system includes three types, the image coordinate system, the page coordinate system, and the display coordinate system. All these coordinate systems take the left top as the origin in units of pixels. The image coordinate system serves to describe the original image data to be displayed. In the example of Fig. 10, an illustration (300 × 200 pixels, 8 tones), a photograph (640 × 480 pixels, 16,000,000 colors), and a font image (64 × 64 pixels per text, 2 tones) are present. The page coordinate system is the virtual coordinate system provided to specify the location and size of an image on the page to be displayed. The display

coordinate system is defined corresponding to the display attributes set forth above.

Each type of image in encoded contents have the information described in the encoded contents interpreted. Then, the display object described by the image coordinate system is converted into the display coordinate system to be displayed as an image on LCD 308. Thus, the image is provided in a visual form for the user.

The manner of the data and the processing program read and processed in the viewer will be described in detail with reference to Figs. 11 and 12 showing the manner of encoded contents recorded in a medium.

First, description is provided on the encrypted contents description method and in association with the processing module. Encrypted contents are described in a group of data or processing program called "module". In the example of the drawing, each module is read out continuously to be reproduced. The steps up to step 3 of Fig. 11 correspond to data required for the entirety of the contents, first read in, and then sequentially reproduced on a page-by-page basis. One module includes a module name, starting delimiter, and ending delimiter. In the example of Fig. 11, 102, for example, designates the starting delimiter, and 1008 designates the ending delimiter. The starting delimiter and ending delimiter are accorded names. Through the module names, a processing module in the viewer, for example, a subroutine program is called up and delivered for processing. For example, an IMAGE module starting with a starting identifier 1002 is interpreted by interpretation module 703 of the viewer. The encoded contents up to ending delimiter 1008 (1003 to 1007) are delivered to the IMAGE processing module. The subsequent process is carried out by the IMAGE processing module.

Interpretation module 703 carries out encoded contents reproduction process by sequentially executing such processing from the beginning to end of the encoded contents.

Respective modules in Figs. 11 and 12 has a region where a contents key is specified. When a contents key is specified in this region, a contents key in the viewer

is searched for before the processing set forth below is carried out. Unless specified otherwise, processing is carried out only in the case where there is a relevant contents key.

The processing at respective modules of Figs. 11 and 12 will be described hereinafter.

IMAGE processing module (name: IMAGE)

Encoded image data is transferred by the system indicated by the compression method identifier, and stored in RAM 302 in the viewer. When the image is transferred properly, an image data ID number is assigned to the relevant image storing region.

TABLE processing module (name: TABLE)

The table data indicating the image processing method is decoded using the specified contents key and transferred to be stored in RAM 302 in the viewer. When the table data is transferred properly, a table ID number is assigned to this table storing region. An example of this processing table is shown in Table 2.

[Table 2]

Process ID	Magnification Process	Shrink Process	Reducing Number of Colors
1	Edge enhancement after bi-linear interpolation	Simple shrink	Bit slice
2	Simple magnification	Simple shrink	Error diffusion
3	Bi-linear interpolation	Bi-linear interpolation	Bit slice

In Table 2, the process set forth below is specified when, for example, processing ID = 1. When a magnification process is to be carried out, an edge enhancement process is carried out after a linear interpolation process. When a shrinking process is to be carried out, the simple shrinking process is carried out. When the process of reducing the number of colors is to be carried out, bit slicing is effected. Bit slicing is a process of discarding lower bits among the color or tones of the image represented by a plurality of bits.

MODULE processing module (Name: MODULE)

The processing module itself is stored into RAM 302 in the viewer as the processing module. When transferred properly, the processing module name is added to the relevant processing module storage region. This module is employed when processing is to be conducted using a module other than modules already present in the viewer.

PAGE processing module (Name: PAGE)

The beginning of page data is indicated, and the number of x pixels and the number of y pixels in a page are stored in RAM 302 as the attributes of the relevant page data. In the case of an electronic book, the region between the descriptor indicating the beginning of the page and the descriptor indicating the end of the page corresponds to each page.

PUTIMAGE processing module (Name: PUTIMAGE)

The image data with the specified ID present in RAM 302 is processed, and transferred to image memory 307, whereby the relevant image is displayed on the LCD. Details of the process of PUTIMAGE processing module will be described in detail with reference to Fig. 13.

The parameters set forth below in Fig. 13, i.e., the number of pixels (Xo × Yo) of the original image (image coordinate system) that is the display object, the original image region starting point coordinates (Xso, Yso), the number of pixels in the region of the original image (DXs × DYs), the number of pixels (Xp × Yp) of a page (page coordinate system), the page region starting point coordinates (Xpo, Ypo) and the number of pixels of the page region (DXp × DYp) are read out from the corresponding region and image data in the module. After the parameters set forth below present in RAM 302 in the viewer, i.e. the number of pixels (Xd × Yd) of the display region (display coordinate system), the region starting point coordinates (Xdo, Ydo) of the display region, and region number of pixels (DXd × DYd) of the display region are extracted, a magnification/shrink process is carried out. The magnification scale is

logically equivalent to carrying out the magnification/shrink process from the page coordinate system to the display coordinate system after the magnification/shrink process from the image coordinate system into the page coordinate system.   In practice, the region of the original image is increased or reduced by the following magnification scale.

Magnification scale of X direction: $(X_d \times DX_p) / (X_p \times DX_s)$ times

Magnification scale of Y direction: $(Y_d \times DY_p) / (Y_p \times DY_s)$ times

The processing table is referred to for selecting a magnification/shrink method. When the number of colors of the original image is greater than the number of colors that can be displayed, the process of reducing the number of colors is carried out by the process of reducing the number of colors obtained by referring to the processing table.

Display is effected of the image subjected to the above-described process of magnification, shrinking and color number reduction by writing into the region with the display coordinate system $(X_{do} = (X_d \times X_{po}) / X_p, Y_{do} = (Y_d \times Y_{po}) / Y_p)$ as the origin.

CAOS processing module (Name: CAOS)

The pixel value of image data with the specified ID is modified by the function set forth below, and then transferred to image memory 307 to display an image on LCD 308.   The process of the present processing module will be described in detail hereinafter.

Using processing parameters in the module, processing set forth below is carried out on an image in RAM 302 (referred to as IO (z) hereinafter) with the specified ID number.   As a result, an image I1 (z) is obtained.   Here, $0 \leqq z (X0 \times Y0)$ is established, where z is the index of pixel data, and the image is formed of $X0 \times Y0$ pixels.

With a (0) = A, the following operation is repeated N times.

$a (n + 1) = P (1 - a (n)) \times a (n)$

$z = a (n + 1) \times X0 \times Y0$

I1 (z) = R (I0 (z))

where A, P and N are numerics recorded in the module. That is, A is the initial value, and 0 < A < 1. P is the processing parameter recorded in the module, and takes a random value, preferably at least 3.6 and not more than 4. N is the number of repetition. Function R implies a bit inversion process, wherein R (x) = M − x when the value of I0 is 0 to M.

Resultant image I1 obtained by the above-described process is subjected to the process of magnification, shrinking, and reducing the number of colors in a manner similar to that of the PUTIMAGE processing module with reference to the parameters recorded in the module. The processed image is transferred to image memory 307 to be displayed.

This process has the advantage set forth below. In producing image data, it is assumed that bit inversion is carried out on the original image with the same CAOS function and parameter, and then compressed to be recorded in the encoded contents as encoded image data. If the encoded contents are simply decoded, pixels corresponding to the output of the CAOS function will be bit-inverted, inducing problems on picture quality. By applying the process set forth above, a proper image can be displayed. Since the CAOS processing module is actuated only when a contents key is present, any viewer absent of a contents key cannot have the image displayed properly.

A processing module using a random number function of RAND, for example, instead of the above-described CAOS function can be defined and processed to achieve a similar advantage, though differing in the display effect and size of the processing module. The above description is based on a process of mixing/removing noise with respect to image data by CAOS. The noise mixture/removal by a CAOS function or the like can be carried out similarly for other modules.

BLUR processing module (Name: BLUR)

After applying a blur process which is one image processing method on image data with the specified ID, the processed image is transferred to image memory 307,

whereby a blurred image is displayed at the LCD. By forcing the number of repetitions N to 0 when a contents key is specified in this process, the blur process is disabled. The process of the present processing modules will be described in detail hereinafter.

Based on processing parameters in the module, the process set forth below is carried out on an image (referred to as IO (x, y) hereinafter) in a RAM 302 with the specified ID number, whereby a resultant image Il (x, y) is obtained. Here, $0 \le x < X0$ and $0 \le y < Y0$ when the image is formed of $X0 \times Y0$ pixels, where x and y are coordinate indexes of pixel data.

The operation set forth below is repeated N time on all the pixels. However, when N = 0, Il = IO, and the process of step 2 is carried out just one. Then, the process ends.

Step 1: Il (x, y) = IO (x, y) $*$ M (P, x, y)

Step 2: image Il is subjected to the process of magnification, reduction, and reducing the number of colors according to a method similar to that of PUTIMAGE processing module. The process image is transferred to image memory 307, and the image is displayed.

Step 3: IO (x, y) = Il (x, y), and repeated from step 1.
It is to be noted that P and N are processing parameters recorded in the module. $*$ M (P, x, y) implies the moving average process using the mask of $P \times P$ centered about coordinates (x, y).

This process has the advantages set forth below. When the present processing module is executed, the displayed image will be gradually blurred if the corresponding contents key is absent. If a content key is present, blurring of the image will not occur. In other words, a viewer absent of a content key cannot have an image displayed properly.

By defining and processing a processing module using various image processing functions such as edge enhancement instead of the above-described function $*$ M, a similar advantage can be achieved, though differing in the display effect and size of the

processing module.

The process of viewer 101 displaying an image by interpreting the encoded contents shown in Figs. 11 and 12 is summarized as below.

(Step 1)

The process is carried out with the IMAGE module. Since there is a contents key 1 in the viewer, encoded image data compressed with MH encoding is subjected to an expansion process. An image data ID number 1 is assigned, and loaded into the RAM as a bit map image.

(Step 2)

The process is carried out with the TABLE module. Since there is a contents key 2 in the viewer, table data is transferred and ID number 1 is assigned. The table is loaded into the RAM as the processing table. In the present example, the processing table can be loaded properly since contents key 2 is present in the viewer. However, there may be a case in the subsequent processing where a process using the present processing table is disabled due to the processing table not being loaded according to the charge account status at the vending device of the user.

(Step 3)

The process is carried out with the MODULE module. Since there is a contents key 3 in the viewer, the encoding processing module is decoded, and a processing module name CAOS is assigned thereto. Then, it is loaded into the RAM. As in step 2, there may be a case where a process using the CAOS processing module may not be executed in the subsequent processes since the module cannot be loaded due to the user charge account status.

(Step 4)

The process is carried out with the PAGE module. Since a contents key is not specified, the process is executed in all cases. Specifically, X pixel numbers 768 and Y pixel numbers 1024 of the page coordinate system are loaded into the RAM as the attributes of page data to be used in subsequent processes until a page ending delimiter /

PAGE arrives.

(Step 5)

The process is carried out with the IMAGE module. Since contents key 2 is present in the viewer and the page pixel number specification (768 × 1024) matches the display attribute loaded at step 4, encoded image data compressed with JBIG coding is subjected to an expansion process, assigned with image data ID number 2, and then loaded into the RAM as a bit map image. Since this is described in the PAGE descriptor, an unload operation from the RAM is effected when the page ending delimiter is interpreted.

(Step 6)

The process is carried out with the IMAGE module. Although contents key 2 is present in the viewer, the page pixel number specification (480 × 640) does not match the display attribute loaded at step 4. Therefore, the process is not executed.

The image specified at step 5 and the image specified at step 6 will not be loaded simultaneously to the RAM since selective processing is effected based on the display attribute. This means that the image of interest in the subsequent processing can be altered by the page pixel number. Specifically, in a magnification/reduction process, a font image or the like may not be displayed in high picture quality depending upon the display format of the viewer. In such a case, the font image can be altered.

(Step 7)

The process is carried out with the IMAGE module. Since contents key 3 is present in the viewer and display attribute specification such as page pixel number specification is absent, encoded image data compressed by JPEG coding is subjected to an expansion process, assigned image data ID number 3, and loaded into the RAM as a bit map image.

For example, in the case where a contents key specified in the IMAGE processing module is not present in the viewer, the relevant image is not loaded. As a result, no display may be provided at the LCD.

(Step 8)

The process with the PUTIMAGE module is carried out on the image of image data ID = 1 already loaded. Since there is contents key 2 in the viewer and there is no display attribute specification such as page pixel number specification, a process is carried out with the PUTIMAGE processing module as set forth above. Since the processing table to be used for the process (ID = 1) is loaded in the memory, the process represented at the row of processing ID1 in the processing table is used when image processing such as magnification, reduction, and reducing the number of colors is required. There are cases where image processing cannot be carried out since the processing table is not loaded depending upon the user charge account status, or when a predetermined default image processing is employed.

(Step 9)

The process with the BLUR module is carried out on the image of image data ID = 3 already loaded. Since contents key 4 is absent in the viewer, the image displayed at the LCD will be gradually blurred over time.

(Step 10)

The process with the CAOS module is carried out on the image of image data ID = 2 already loaded. Since contents key 3 is present in the viewer, the relevant image will be displayed properly even if the image is image-processed with the CAOS function in advance. A similar process is carried out subsequently in accordance with the contents of the encoded contents.

The above description is based on the case where medium 102 in which single contents are recorded is reproduced and displayed. In general, a plurality of contents are recorded in the medium for every title of an electronic book. Reproduction and display are effected according to the charge account status in the units of the contents.

The above description is provided in association with processing on an image. It is possible to describe the audio reproduction module or text data display module in encoded contents to effect control of execution in accordance with the presence/absence

of a contents key.

Furthermore, the process carried out by respective apparatuses in the present system may be stored in a computer-readable recording medium such as a magnetic disk, optical disk, IC card, or the like to be used by being installed appropriately or distributed through a communication line.

The case where the above-described bit string is present in a nonreadable region of a medium will be described with reference to Figs. 14 and 15 hereinafter.

Fig. 14 represents the extraction of elements used in the description set forth below among various elements of Fig. 5. The difference from Fig. 5 is that a certain bit string is written in advance in a nonreadable region of medium 102, and that a detection module 1401 to detect a bit string in a nonreadable region is provided in the viewer. The bit string in the nonreadable region is not limited to the structure of the above description. At least discrimination of whether a bit string is present or not is required.

A nonreadable region will be described with reference to Fig. 15. Fig. 15(a) shows a medium 102 in the form of a disk type recording medium such as a CD-ROM or MD. As used herein, a readable region is a region where information can be read out through a general-purpose reader in accordance with the normal operation by a user. A nonreadable region is a region where information cannot be read out through the normal operation by a user or a general-purpose reader. By writing particular information or pattern at the outer circumferential or inner circumferential area of a disk where data cannot be read out with a general-purpose reader, a bit string can be recorded in a nonreadable region. In this case, the viewer detects a bit string at a nonreadable region through detection module 1401.

Fig. 15(b) shows a case 1501 in which a medium 102 such as a CD-ROM or MD is accommodated. Upon inserting case 1501 into the viewer, a slot 1502 opens to allow information to be read out from medium 102. The readable region is similar to that shown in Fig. 15(a). A nonreadable region is identified as a region 1503 corresponding to the bit string in the nonreadable region of case 1501. Region 1503 is

produced by applying a bar code seal or asperity to case 1501. The viewer detects the bit string in region 1503 with detection module 1401.

The process when a bit string in a nonreadable region is detected by detection module 1401 will be described with reference to Fig. 14. The process of reproduction and display in the viewer is effected by the two methods set forth below.

(Method 1)   Another contents key present in the viewer is rendered valid, and used in the process with the code module 501.

(Method 2)   The detected bit string is input into solution operation module 507. Following a process similar to that of a bit string present in a readable region of medium 102, a contents key is generated and used in the process by decode module 508.

Thus, even in the case where the information in the medium is copied using a general purpose reader, reproduction is inhibited, and display control described in detail previously is allowed.   For example, when the copy is illegal, control can be provided so that the image is blurred.

[Advantage of Invention]

In accordance with the present invention, appropriate reproduction can be conducted with an electronic book display apparatus having various display attributes. In addition to allowing display for proper users, there is an advantage that the display contents can be altered in a flexible manner according to the charge account status for respective contents.

[Brief Description of the Drawings]

Fig. 1 shows an entire structure of the system.

Fig. 2 shows a structure of a vending device.

Fig. 3 shows a structure of a viewer.

Fig. 4 shows a structure of a key management center.

Fig. 5 is a diagram to describe the processing contents of the system based on function.

Fig. 6 shows an example of a bit string identified as auxiliary information.

Fig. 7 is a diagram to describe contents charge account information.

Fig. 8 is a diagram to describe the processing contents of a decode module in the viewer based on function.

Fig. 9 exemplifies the type of a viewer and display format.

Fig. 10 is a diagram to describe coordinate systems employed in the process at the viewer.

Fig. 11 is a diagram to schematically describe the contents of recorded contents.

Fig. 12 is a diagram to describe schematically the contents of recorded contents subsequent to Fig. 11.

Fig. 13 is a diagram to describe coordinate conversion.

Fig. 14 is an extraction of elements from the system of Fig. 5 required to describe another embodiment.

Fig. 15 shows an example of a medium to describe a readable region and a nonreadable region.

[Description of Reference Characters]

101   viewer

102   medium

103   vending device

104   distribution center

108   publisher

110   key management center

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ファイル名 = p9801673

メッセージ — — — — — — — —10— — — — — — —20— — — — — — — 30— — — —

コード 【書類名】 図面
document name drawings
【図1】
Fig. 1

イメージ
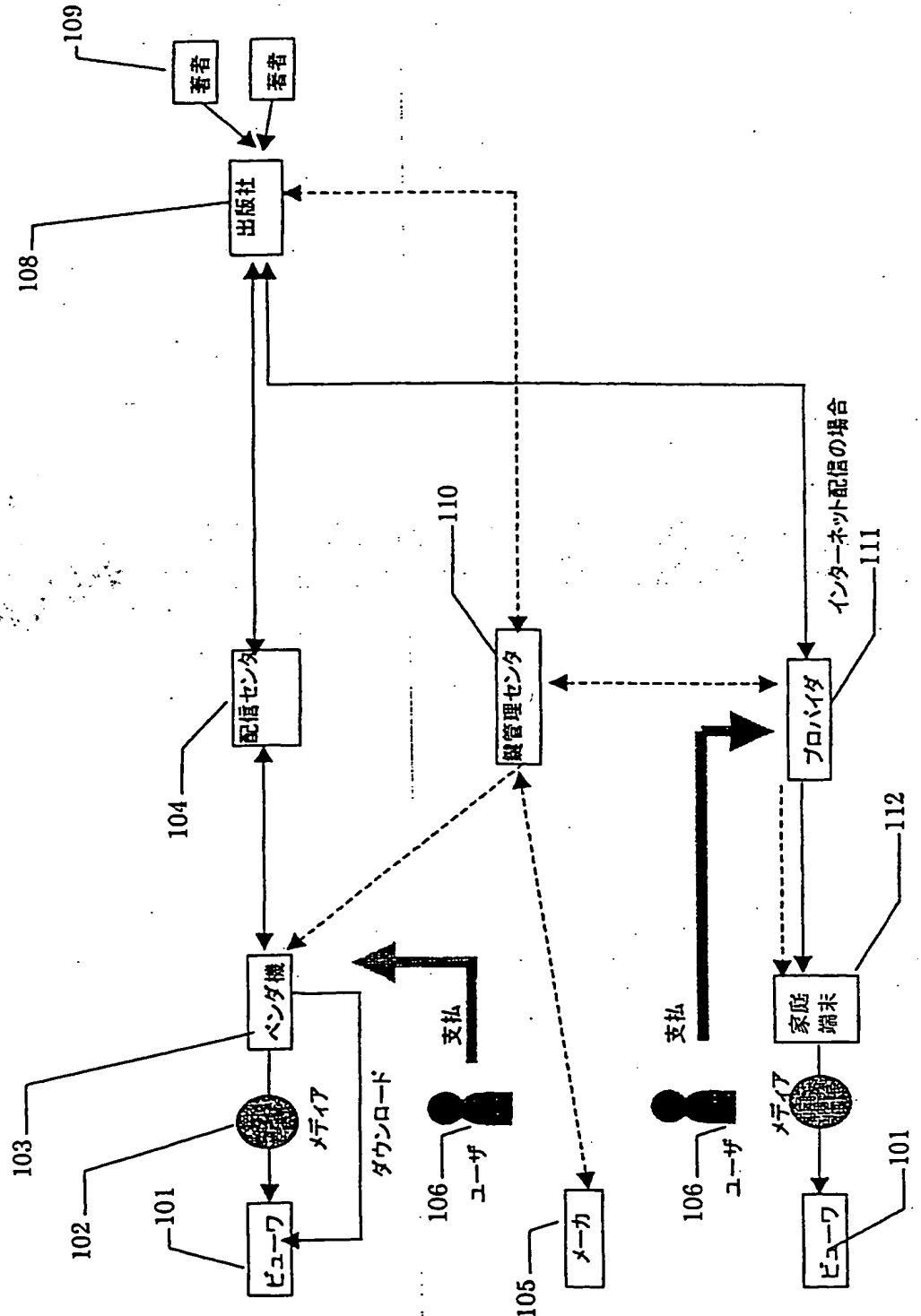
ファイル名 ＝ p9801673

メッセージ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ 10 ─ ─ ─ ─ ─ ─ ─ ─ ─ 20 ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ 30 ─ ─ ─ ─ ─

コード 【図2】

イメージ Fig. 2

Fig. 2
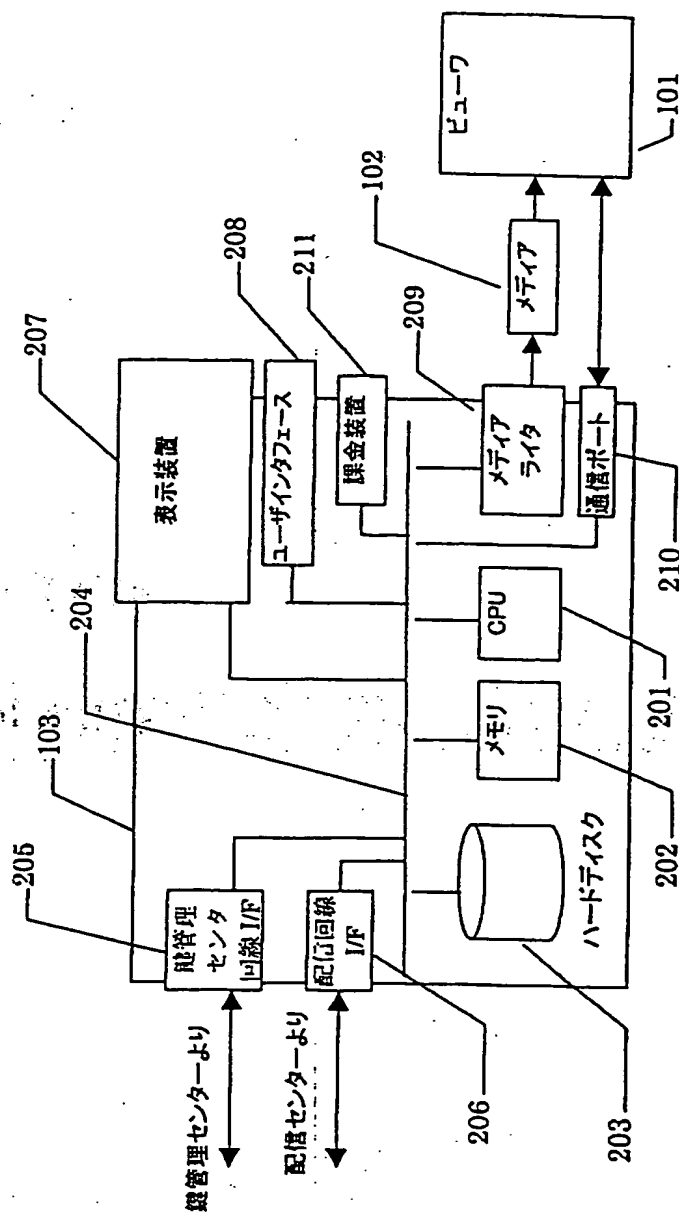
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コード 【図3】

イメージ Fig. 3
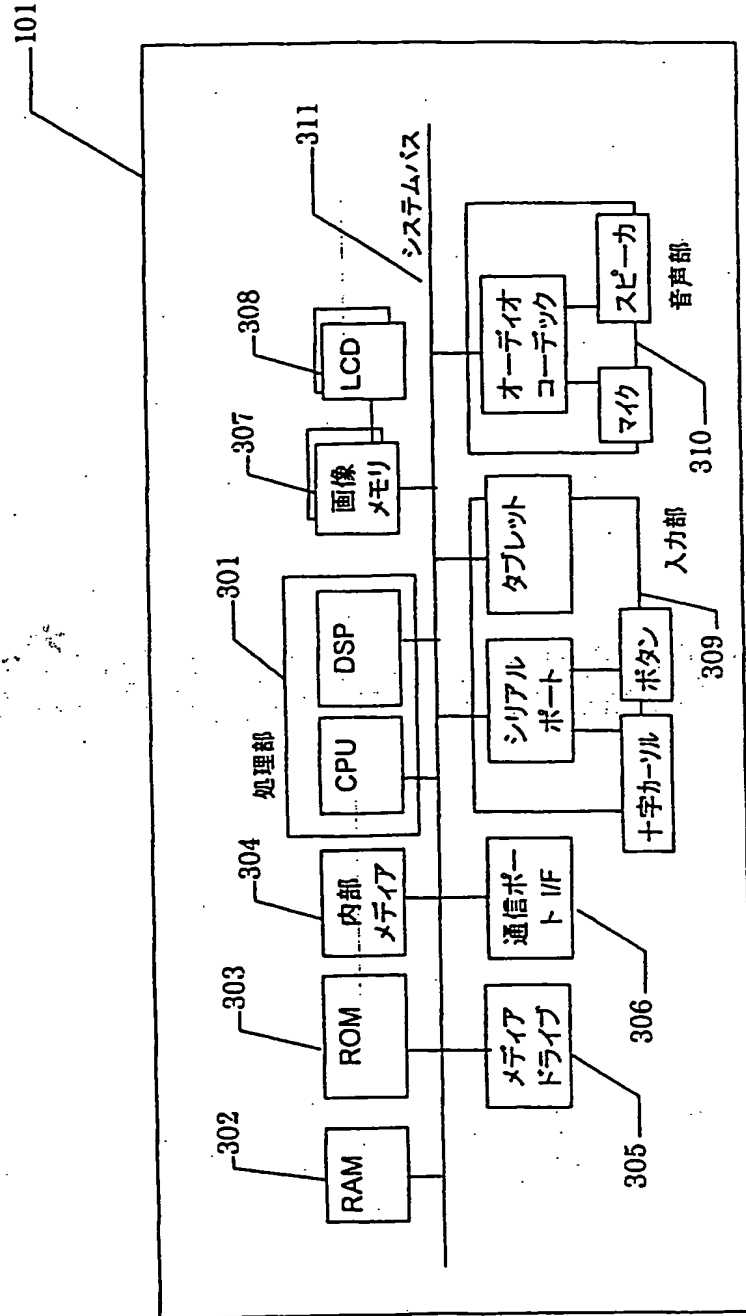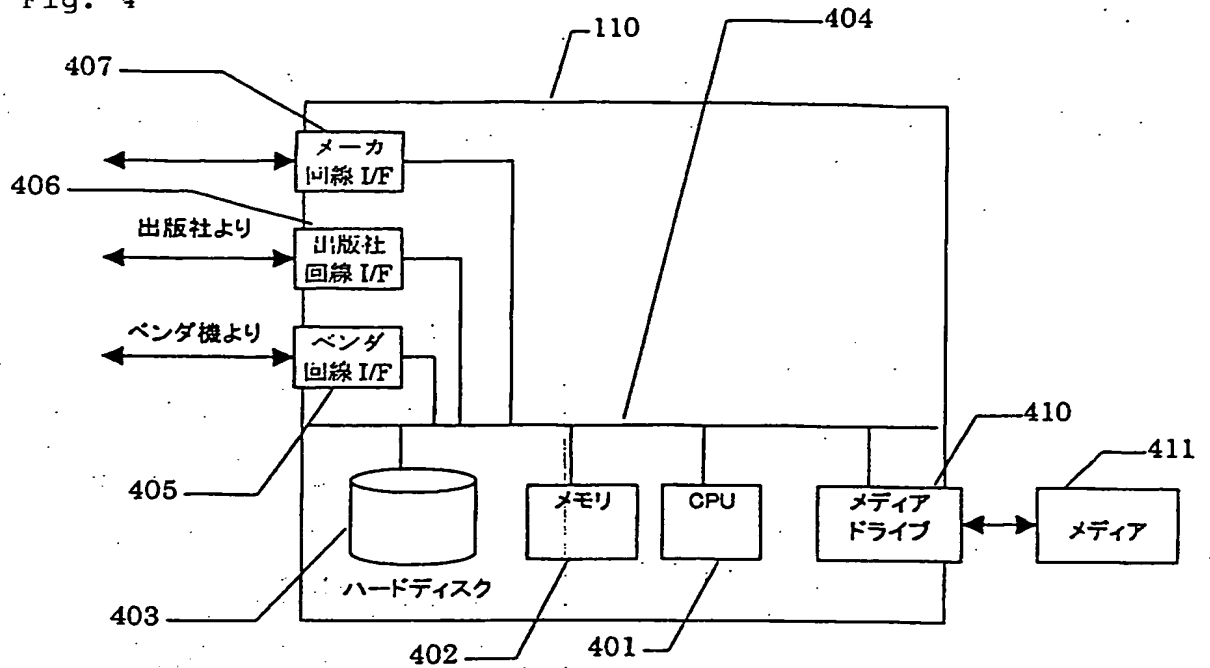
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コード 【図4】

イメージ Fig. 4

ファイル名 ＝ p9801673

コード　【図5】

イメージ　Fig. 5

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メッセージ ー ー ー ー ー ー ー ー ー ー 10 ー ー ー ー ー ー ー ー ー 20 ー ー ー ー ー ー ー ー 30 ー ー ー ー ー

コード　【図6】
イメージ　　　Fig. 6

ビット数	演算種識別子	演算結果

601　602　603

32ビット　8ビット　Nビット

コード　【図7】
イメージ　　　Fig. 7

504　1201
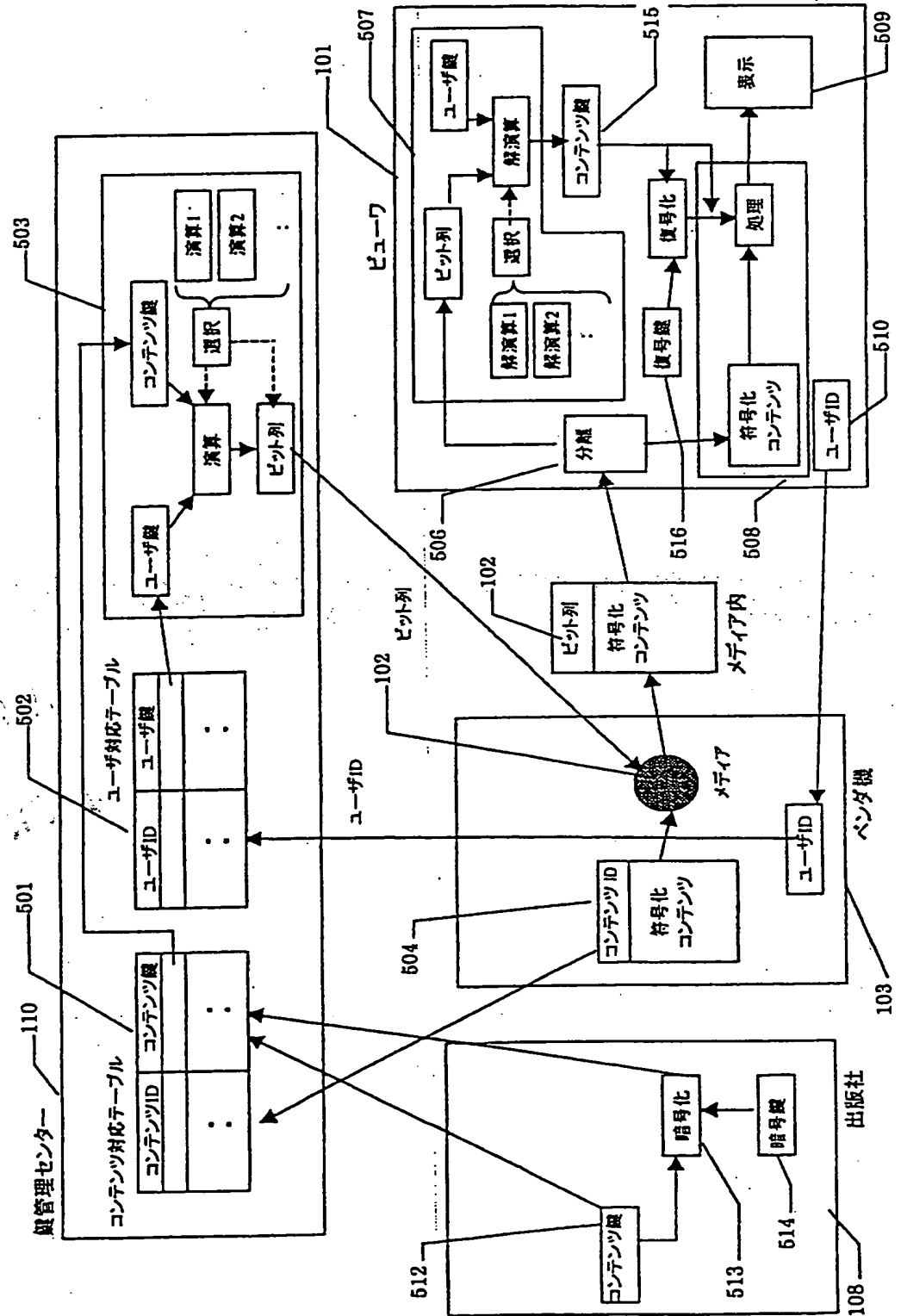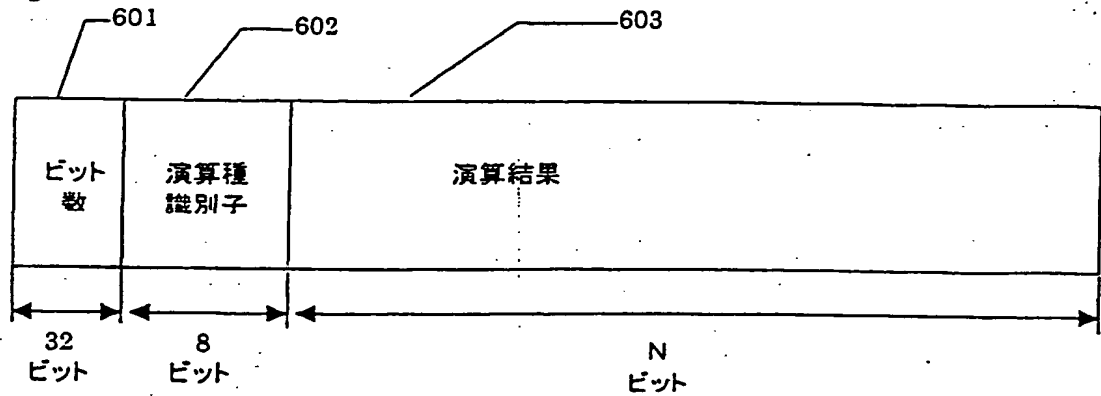
コンテンツ課金情報	金額	コンテンツID
符号化コンテンツ	100円	コンテンツID1
	200円	コンテンツID2
	300円	コンテンツID3
	400円	コンテンツID4

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コード　　【図8】

イメージ　　Fig. 8

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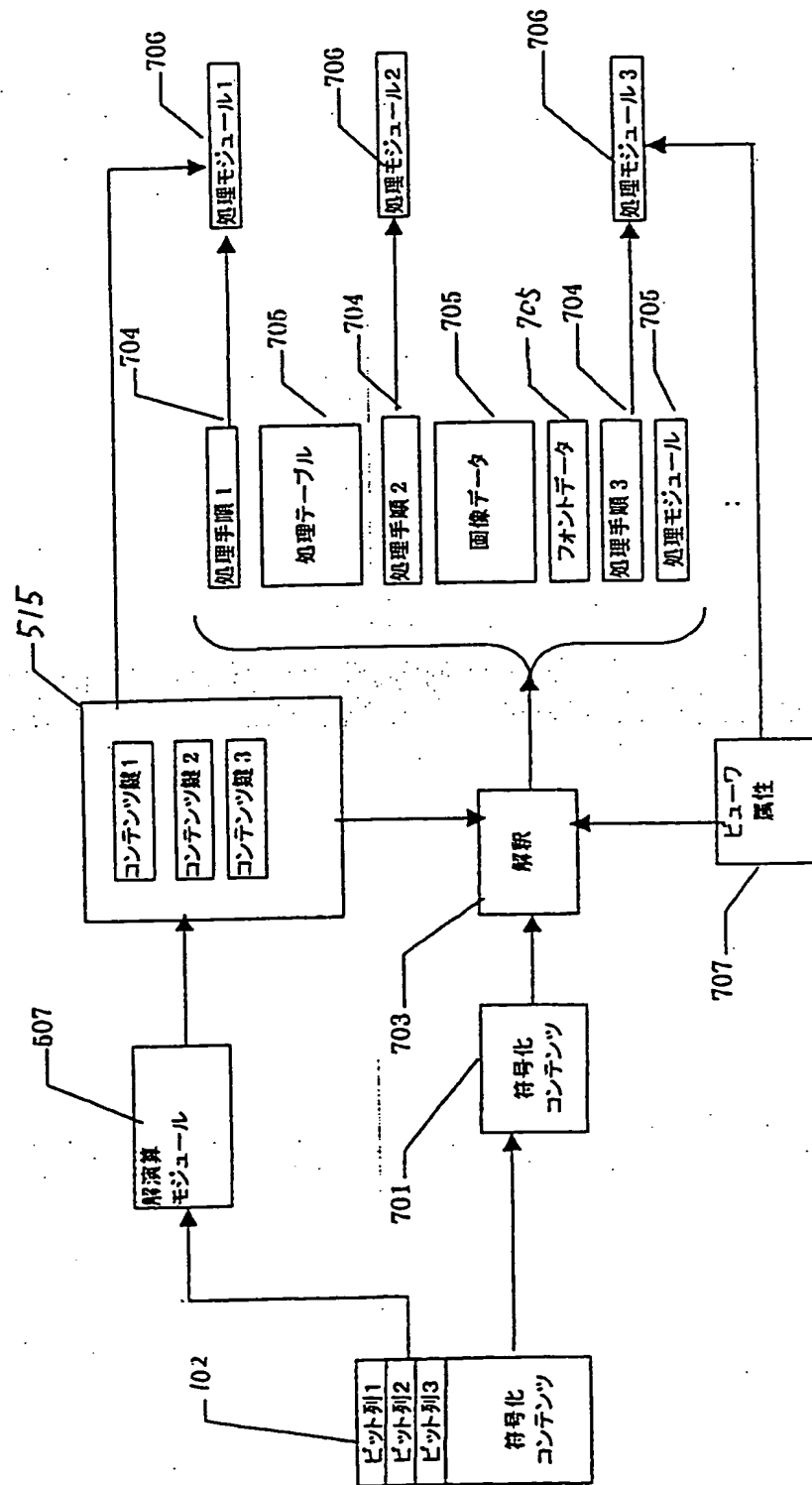
コード 【図9】

イメージ Fig. 9
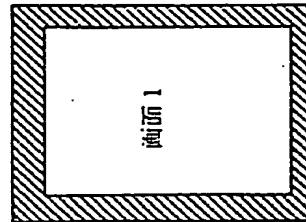
480×640画素
カラー26万色
液晶1枚使用
（d）

画面1
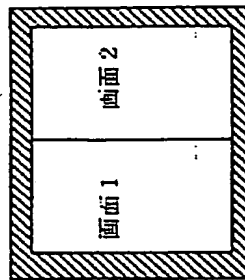
768×1024画素
モノクロ8階調
液晶1枚使用
（c）

画面2 画面1
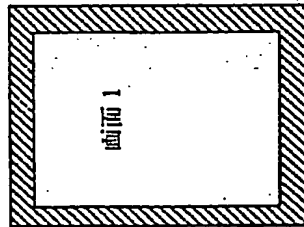
画面1
（b）
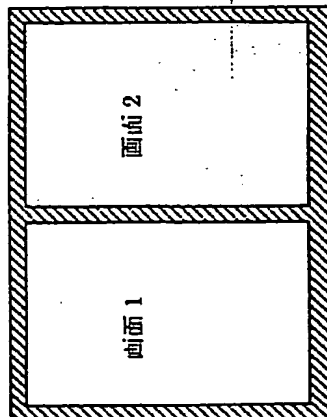
768×1024画素、
モノクロ8階調
液晶2枚見開き使用
（a）

画面2

画面1

コード 【図１０】
Fig. 10

イメージ

画像座標系

ページ座標系

表示座標系

イラスト
300x200 画素
8 階調

768 x 1024

480 x 640

写真
640x480 画素、
1600 万色カラー

フォント画像
1 文字 64x64 画素
2 階調、モノクロ
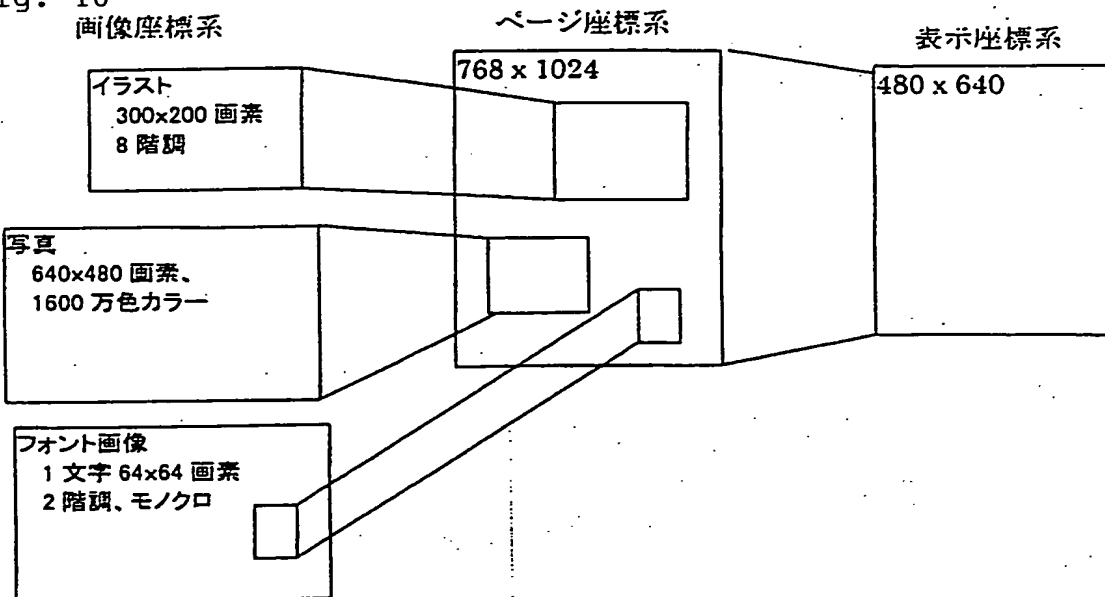
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コード　【図１１】

イメージ　　　Fig. 11

IMAGE	画像データ開始識別子	1002
1	画像データ ID 番号	1003
MH	画像データの圧縮方法識別子	1004
コンテンツ鍵1	処理に用いるコンテンツ鍵種	1005
なし	使用する処理テーブル ID	1006
符号化画像データ	圧縮された画像データ	1007
／IMAGE	画像データ終了識別子	1008
TABLE	処理テーブル始まり識別子	1009
1	テーブルの ID 番号	
コンテンツ鍵2	テーブルデータ展開のための鍵種	
テーブルデータ		
／TABLE	処理テーブル終わり記述子	
MODULE	モジュール処理開始識別子	
CAOS	モジュール名	
コンテンツ鍵3	モジュールデータ展開のための鍵種	
符号化処理モジュール		
／MODULE	モジュール処理終了識別子	
PAGE	ページ始まり記述子	
768	ページの x 画素数	
1024	ページの y 画素数	
IMAGE	画像データ開始識別子	
2	画像データの ID 番号	
JBIG	画像データの圧縮方法識別子	
768×1024	表示画素数指定（x×y）	
コンテンツ鍵2	処理に用いるコンテンツ鍵種	
画像データ		
／IMAGE	画像データ終了識別子	
IMAGE	画像データ開始識別子	
2	画像データの ID 番号	
JBIG	画像データの圧縮方法識別子	
480×640	表示画素数指定（x×y）	
コンテンツ鍵2	処理に用いるコンテンツ鍵種	
符号化画像データ		
／IMAGE	画像データ終了識別子	
IMAGE	画像データ開始識別子	
3	画像データの ID 番号	
JPEG	画像データの圧縮方法識別子	
コンテンツ鍵3	処理に用いるコンテンツ鍵種	
符号化画像データ		
／IMAGE	画像データ終了識別子	

ステップ1
ステップ2
ステップ3
ステップ4
ステップ5
ステップ6
ステップ7

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コード 【図１２】

イメージ　　Fig. 12

PUTIMAGE	画像描画処理開始識別子
1	画像データのID
1	使用するテーブルのID番号
1	テーブル内処理のID番号
コンテンツ鍵2	
0	ソースX座標Xso
0	ソースY座標Yso
100	ソース矩形X画素数DXs
100	ソース矩形Y画素数DYs
120	デスティネーションX座標Xdo
150	デスティネーションy座標Ydo
100	デスティネーション矩形X画素数DXd
100	デスティネーション矩形Y画素数DYd
／PUTIMAGE	画像描画処理終了識別子
BLUR	画像ぼかし処理開始識別子
3	画像データのID
コンテンツ鍵4	
3	処理開始秒数
1	処理繰り返し期間（秒）
10	くりかえし回数
3	ぼかし矩形サイズ
100	ソースX座標Xso
100	ソースY座標Yso
64	ソース矩形X画素数DX
64	ソース矩形Y画素数DY
530	デスティネーションX座標Xdo
540	デスティネーションy座標Ydo
64	デスティネーション矩形X画素数DXd
64	デスティネーション矩形Y画素数DYd
／BLUR	画像ぼかし処理終了識別子
CAOS	カオス処理開始識別子
2	描画する画像データのID
コンテンツ鍵3	
0	ソースX座標Xso
0	ソースY座標Yso
100	ソース矩形X画素数DX
100	ソース矩形Y画素数DY
120	デスティネーションX座標Xdo
150	デスティネーションY座標Ydo
100	デスティネーション矩形X画素数DXd
100	デスティネーション矩形Y画素数DYd
10	くりかえし回数
0.8	初期値A
3.8	処理パラメタP
／CAOS	カオス処理処理終了識別子
：	
／PAGE	ページ終了記述子
PAGE	
：	
／PAGE	

ステップ8

ステップ9

ステップ10

出 願 書 類 プ ル ー フ
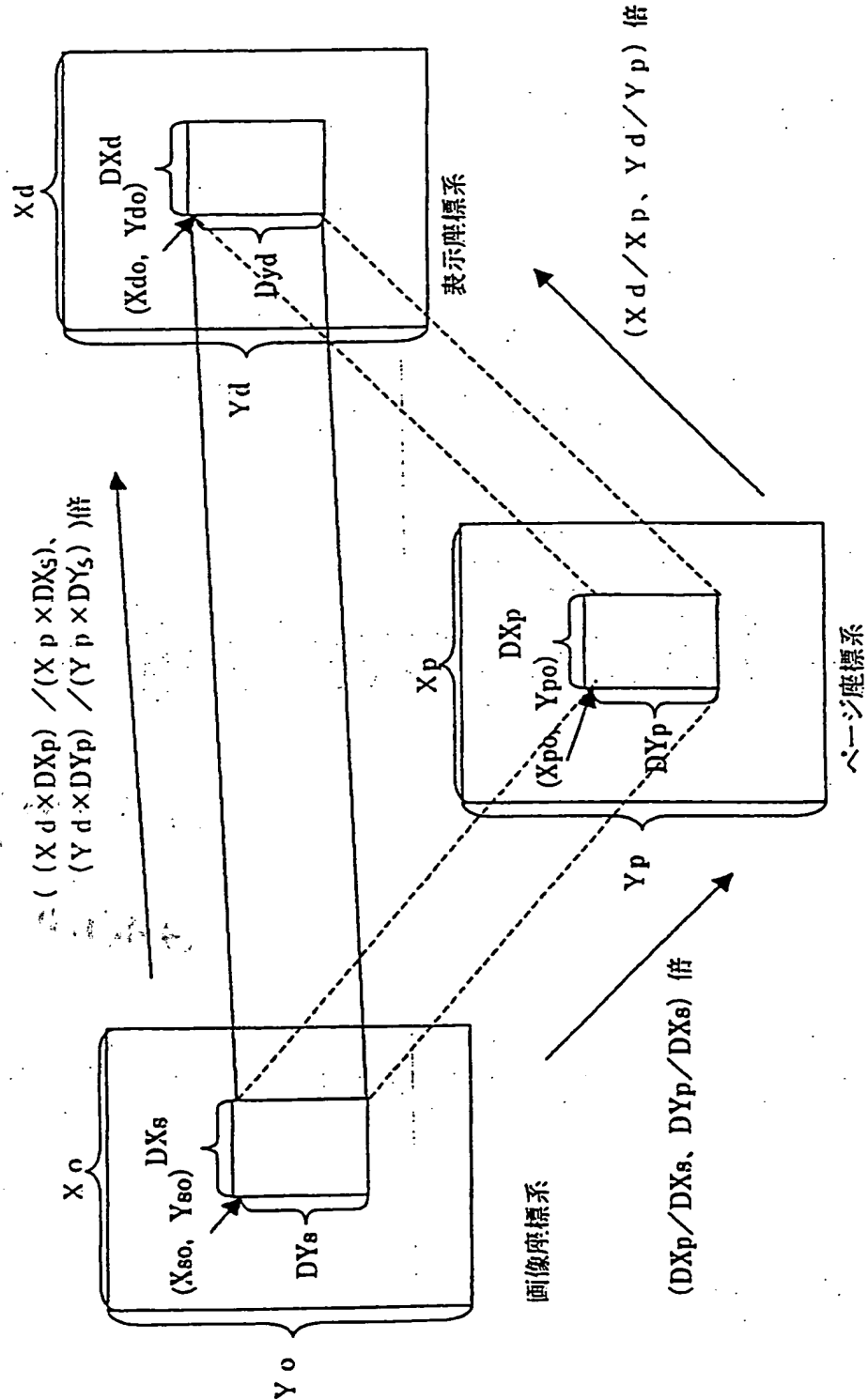
ファイル名 ＝ p9801673

メッセージ ー ー ー ー ー ー ー ー10ー ー ー ー ー ー ー ー20ー ー ー ー ー ー ー ー30ー ー ー ー ー

コード 【図１３】
　　　　　Fig. 13

イメージ

X_d

DX_d

(X_{do}, Y_{do})

Dy_d

Y_d

表示座標系

$(X_d/X_p, Y_d/Y_p)$ 倍

$((X_d \times DX_p) / (X_p \times DX_s), (Y_d \times DY_p) / (Y_p \times DY_s))$ 倍

DX_p

X_p

(X_{po}, Y_{po})

DY_p

ページ座標系

Y_p

DX_s

X_o

(X_{so}, Y_{so})

DY_s

Y_o

画像座標系

$(DX_p/DX_s, DY_p/DX_s)$ 倍

ファイル名 ＝ p9801673

メッセージ ー ー ー ー ー ー ー ー ー10ー ー ー ー ー ー ー ー ー ー20ー ー ー ー ー ー ー ー ー30ー ー ー ー ー

コード 【図14】
　　　　　Fig. 14

イメージ

ファイル名 ＝ p9801673

メッセージ ー ー ー ー ー ー ー ー ー 10 ー ー ー ー ー ー ー ー 20 ー ー ー ー ー ー ー ー 30 ー ー ー ー ー

コード 【図１５】

イメージ Fig. 15

非可読領域

可読領域

102

(a)

1503

1501

1502

102
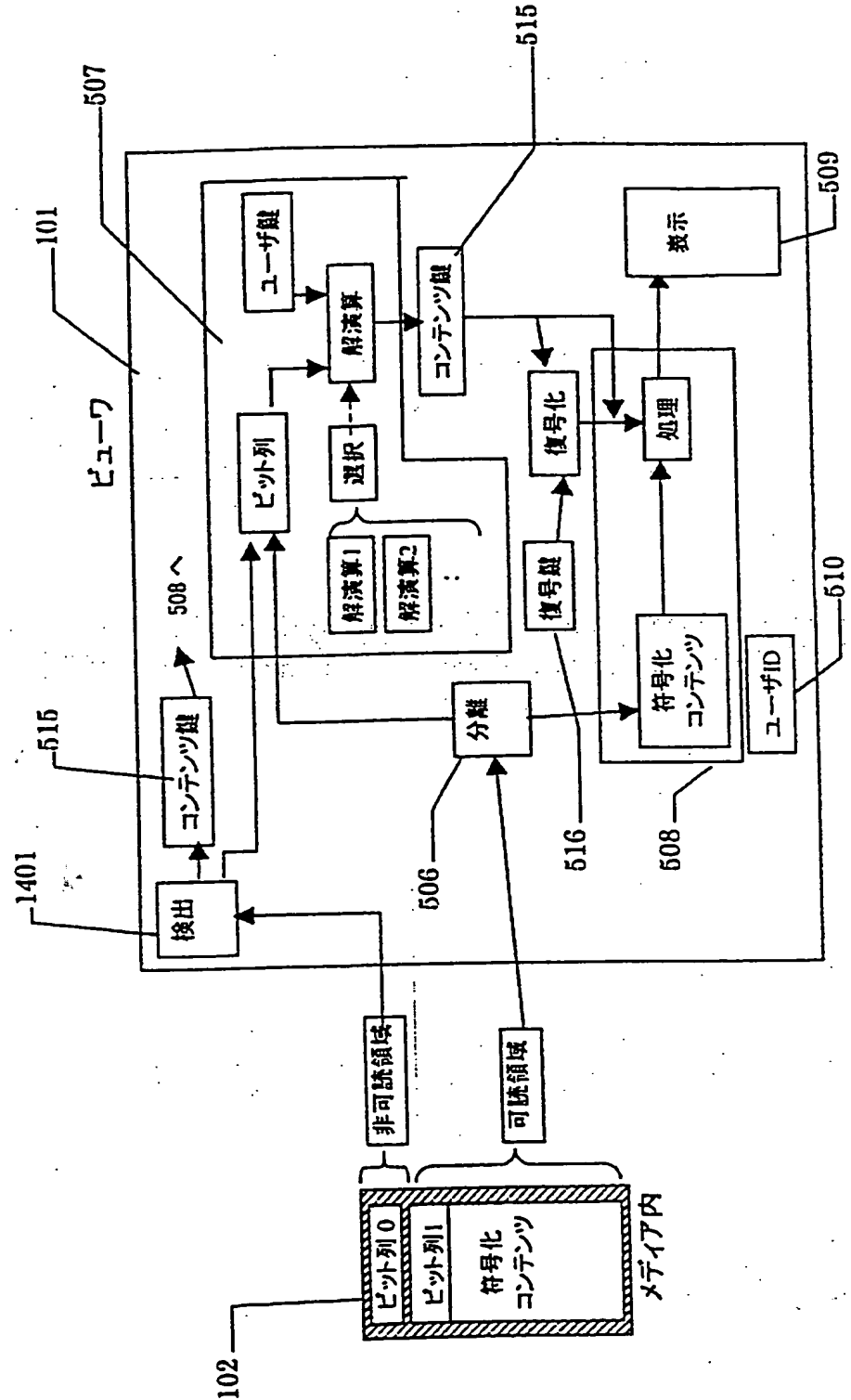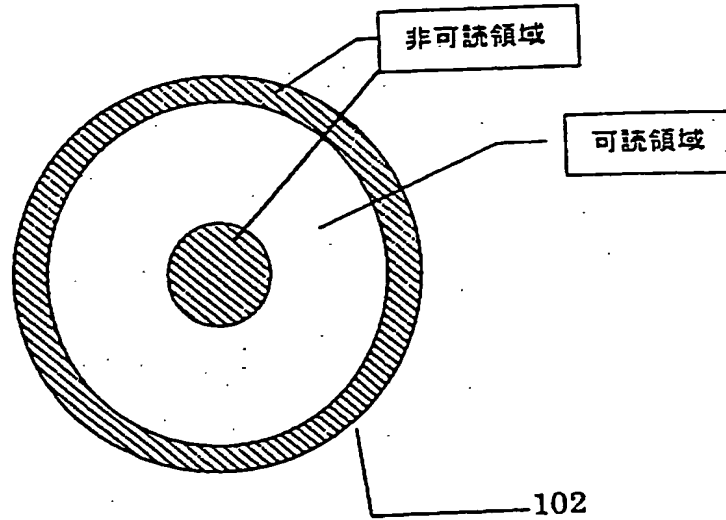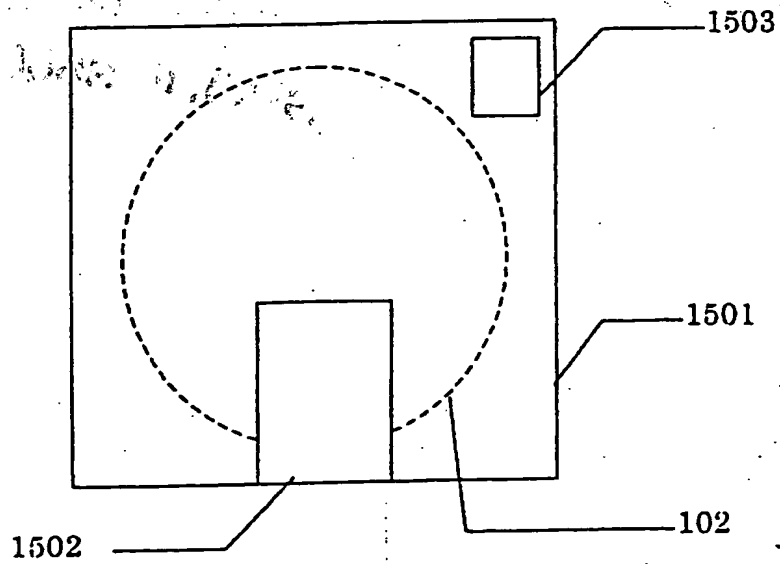
(b)

FIG. 1

101	viewer
103	vending device
102	medium
	download
104	distribution center
108	publisher
109	writer
106	user
	payment
105	manufacturer
110	key management center
112	household terminal
111	provider
	when distributed by internet

FIG. 2

from key management center

from distribution center

205	key management center line I/F
206	distribution line I/F
203	hard disk
202	memory
207	display device
208	user interface
211	charge account device
209	medium writer
210	communication port

102   medium

101   viewer

FIG. 3

304   internal medium

301   processing unit

307   image memory

311   system bus

305   medium drive

306   communication port I/F

309   input unit

        crosshair cursor

        serial port

        tablet

        button

310   audio unit

        audio codec

        microphone

        speaker

FIG. 4

407   manufacturer line I/F

        from publisher

406   publisher line I/F

        from vending device

405   vender line I/F

403   hard disk

402   memory

410   medium drive

411   medium

FIG. 5

110   key management center

501   contents correspondence table

        contents ID   contents key

502   user correspondence table

        user ID   user key

503   user key

        contents key

        operation

        bit string

        selection

        operation 1

        operation 2

108   publisher

512   contents key

513   encryption

514   encryption key

103   vending device

504   contents ID

        encoded contents

102   medium

        user ID

        bit string

102   bit string

        encoded contents

        within medium

101   viewer

506   separation

507   ⎧ bit string
       ⎪ solution operation 1
       ⎨ solution operation 2
       ⎪ selection
       ⎪ solution operation
       ⎩ user key

515   contents key

516   decode key

       decode

508   ⎧ encoded contents
       ⎨ process
       ⎩

510   user ID

509   display

FIG. 6

601   bit number

602   operation type identifier

603   operation result

       32 bits   8 bits   N bits

FIG. 7

504   contents charge account information

       encoded contents

1201   amount   contents ID

       100 yen   contents ID 1

       200 yen   contents ID 2

       300 yen   contents ID 3

       400 yen   contents ID 4

FIG. 8

102	bit string 1
	bit string 2
	bit string 3
	encoded contents
507	solution operation module
515	contents key 1
	contents key 2
	contents key 3
701	encoded contents
703	interpretation
707	viewer attribute
704	process procedure 1
705	processing table
704	process procedure 2
705	image data
705	font data
704	process procedure 3
705	processing module
706	processing module 1 processing module 2
	processing module 3

FIG. 9(a)

screen 1,   screen 2

768 × 1024 pixels

monochrome 8 tones

use 2 LCD panels

(b)

screen 1

(c)

screen 1, screen 2

768 × 1024 pixels

monochrome 8 tones

use 1 LCD panel

(d)

screen 1

480 × 640 pixels

260,000 colors

use 1 LCD panel

FIG. 10

image coordinate system

illustration 300 × 200 pixels

8 tones

photograph

640 × 480 pixels

16,000,000 colors

font image

64 × 64 pixels per character

two tones, monochrome

page coordinate system

display coordinate system

FIG. 11

IMAGE	IMAGE DATA STARTING DELIMITER	1002
1	IMAGE DATA ID NUMBER	1003
MH	COMPRESSION METHOD IDENTIFIER OF IMAGE DATA	1004
CONTENTS KEY 1	CONTENTS KEY TYPE USED FOR PROCESS	1005
NONE	PROCESSING TABLE ID TO BE USED	1006
ENCODED IMAGE DATA	COMPRESSED IMAGE DATA	1007
/IMAGE	IMAGE DATA ENDING DELIMITER	1008

STEP 1

TABLE	PROCESSING TABLE STARTING DELIMITER	1009
1	TABLE ID NUMBER	
CONTENTS KEY 2	KEY TYPE TO DECODE TABLE DATA	
TABLE DATA		
/TABLE	PROCESSING TABLE ENDING DELIMITER	

STEP 2

MODULE	MODULE PROCESSING STARTING DELIMITER
CAOS	MODULE NAME
CONTENTS KEY 3	KEY TYPE TO DECODE MODULE DATA
ENCODE PROCESS MODULE	
/MODULE	MODULE PROCESS ENDING DELIMITER

STEP 3

PAGE	PAGE STARTING DELIMITER
768	PAGE WIDTH IN PIXELS
1024	PAGE HEIGHT IN PIXELS

STEP 4

IMAGE	IMAGE DATA STARTING DELIMITER
2	IMAGE DATA ID NUMBER
JBIG	COMPRESSION METHOD IDENTIFIER OF IMAGE DATA
768×1024	NUMBER OF DISPLAYABLE PIXELS (x×y)
CONTENTS KEY 2	CONTENTS KEY TYPE USED IN PROCESS
IMAGE DATA	
/IMAGE	IMAGE DATA ENDING DELIMITER

STEP 5

IMAGE	IMAGE DATA STARTING DELIMITER
2	IMAGE DATA ID NUMBER
JBIG	COMPRESSION METHOD IDENTIFIER OF IMAGE DATA
480×640	NUMBER OF DISPLAYABLE PIXELS (x×y)
CONTENTS KEY 2	CONTENTS KEY TYPE USED IN PROCESS
ENCODED IMAGE DATA	
/IMAGE	IMAGE DATA ENDING DELIMITER

STEP 6

IMAGE	IMAGE DATA STARTING DELIMITER
3	IMAGE DATA ID NUMBER
JPEG	COMPRESSION METHOD IDENTIFIER OF IMAGE DATA
CONTENTS KEY 3	CONTENTS KEY TYPE USED IN PROCESS
ENCODED IMAGE DATA	
/IMAGE	IMAGE DATA ENDING DELIMITER

STEP 7

FIG. 12

PUTIMAGE	IMAGE DRAW PROCESS STARTING DELIMITER
1	IMAGE DATA ID
1	ID NUMBER OF TABLE TO BE USED
1	ID NUMBER OF TABLE INTERNAL PROCESS
CONTENTS KEY 2	
0	SOURCE X COORDINATE Xso
0	SOURCE Y COORDINATE Yso
100	SOURCE RECTANGLE WIDTH IN PIXELS DXs
100	SOURCE RECTANGLE HEIGHT IN PIXELS DYs
120	DESTINATION X COORDINATE Xdo
150	DESTINATION Y COORDINATE Ydo
100	DESTINATION RECTANGLE WIDTH IN PIXELS DXd
100	DESTINATION RECTANGLE HEIGHT IN PIXELS DYd
/PUTIMAGE	IMAGE DRAW PROCESS ENDING DELIMITER

STEP 8

BLUR	IMAGE BLUR PROCESS STARTING DELIMITER
3	IMAGE DATA ID
CONTENTS KEY 4	
3	NUMBER OF SECONDS OF PROCESS START
1	TERM OF PROCESS REPETITION (SECONDS)
10	NUMBER OF REPETITIONS
3	BLUR RECTANGLE SIZE
100	SOURCE X COORDINATE Xso
100	SOURCE Y COORDINATE Yso
64	SOURCE RECTANGLE WIDTH IN PIXELS DX
64	SOURCE RECTANGLE HEIGHT IN PIXELS DY
530	DESTINATION X COORDINATE Xdo
540	DESTINATION Y COORDINATE Ydo
64	DESTINATION RECTANGLE WIDTH IN PIXELS DXd
64	DESTINATION RECTANGLE HEIGHT IN PIXELS DYd
/BLUR	IMAGE BLUR PROCESS ENDING DELIMITER

STEP 9

CAOS	CHAOS PROCESS STARTING DELIMITER
2	ID OF IMAGE DATA TO BE DRAWN
CONTENTS KEY 3	
0	SOURCE X COORDINATE Xso
0	SOURCE Y COORDINATE Yso
100	SOURCE RECTANGLE WIDTH IN PIXELS DX
100	SOURCE RECTANGLE HEIGHT IN PIXELS DY
120	DESTINATION X COORDINATE Xdo
150	DESTINATION Y COORDINATE Ydo
100	DESTINATION RECTANGLE WIDTH IN PIXELS DXd
100	DESTINATION RECTANGLE HEIGHT IN PIXELS DYd
10	NUMBER OF REPETITIONS
0.8	INITIAL VALUE A
3.8	PROCESS PARAMETER P
/CAOS	CHAOS PROCESS ENDING DELIMITER

STEP 10

:	
/PAGE	PAGE ENDING DELIMITER
PAGE	
:	
/PAGE	

FIG. 13

image coordinate system

page coordinate system

display coordinate system

(　　　times)

FIG. 14

102　　bit string 0

bit string 1

encoded contents

within medium

nonreadable region

readable region

101　　viewer

1401　detection

515　　contents key　　→　　to 508

506　　separation

508　　encoded contents

process

510　　user ID

507 ⎧ bit string

solution operation 1

solution operation 2

selection

solution operation

user key

515　　contents key

516　　decode key

decode

- 9 -

process

509   display

FIG. 15(a)

nonreadable region

readable region